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Pasadena, California

Status of AIRS Only Retrieval

AKA No AMSU Retrieval

AIRS Science Team Meeting

California Institute of Technology
Pasadena, California
March, 2006

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Summary

- Version 4.1.7 can retrieve without AMSU
  - Cloudy Regression replaces MW only algorithm
  - Cloudy regression is followed by cloud clearing and the rest of team algorithm without the use of AMSU data
- AIRS Only retrieval works well, but with outlier issues
- Each build of PGE software is tested with and without AMSU
- The PLR test as an additional QC has been implemented but not analyzed yet
- To do list
  - New regression based on training set with above PLR filter (L Zhou)
  - Regression based error estimate (Susskind/Blaisdell)
  - QC based on regression error estimate (Susskind/Blaisdell)
  - Possible upgrade of QC (Lee/Susskind/Barnet)

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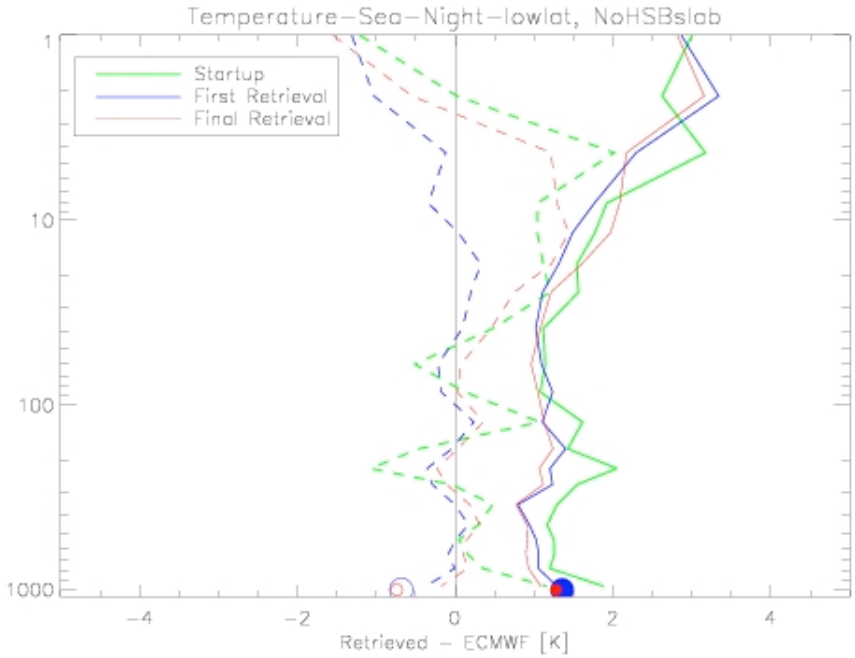
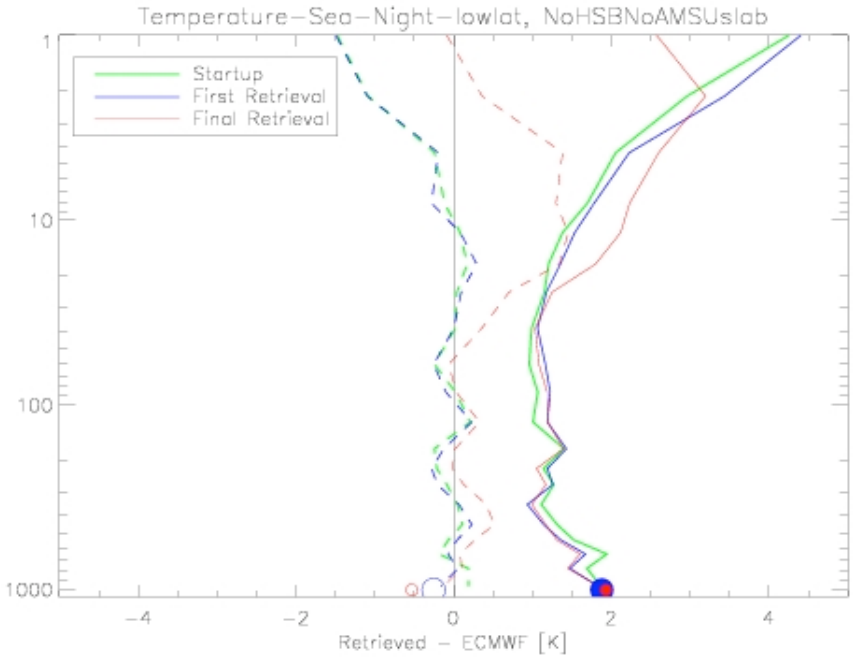
Latest Statistics over Ocean Surface



AIRS/AMSU



AIRS only

- V4.2.2 temperature statistics wrt ECMWF, over day night cases
- V4.2.2 has new RTA as well as new tuning, but no new error estimate or QC
- Red/Cloudy Regression or MW only, Blue/Initial Regression, and Green/final retrieval

Sylee 2/28/06

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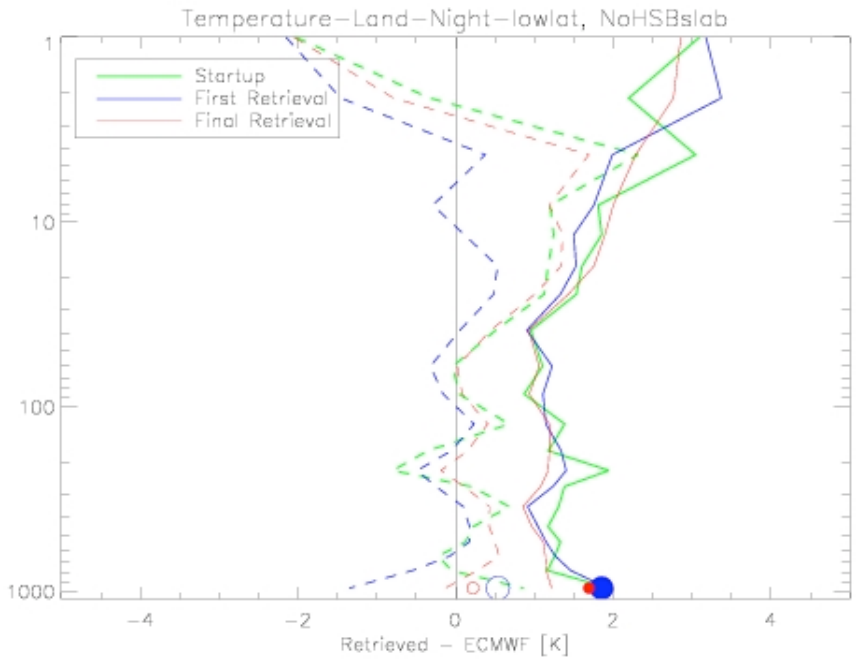
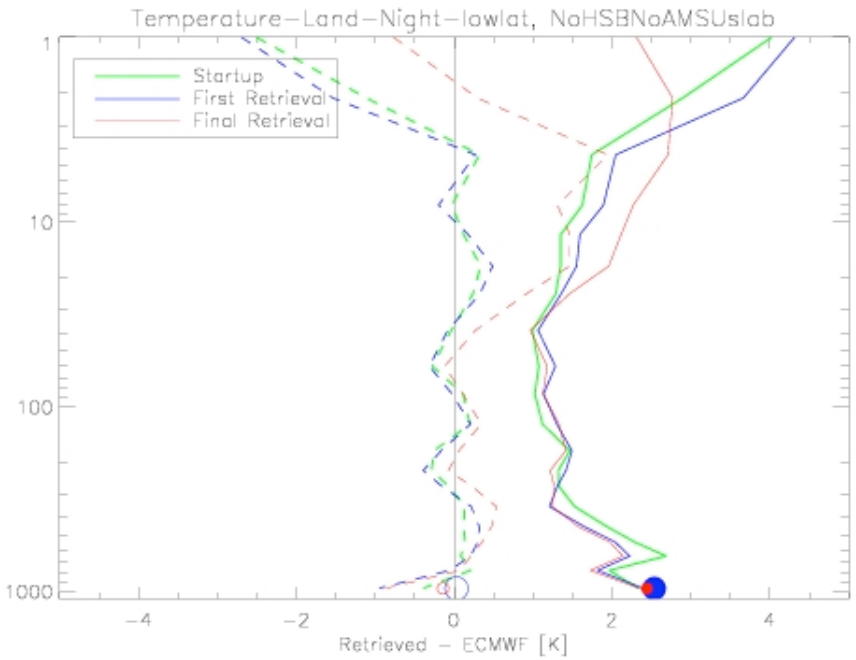
Latest Statistics over Land Surface



AIRS/AMSU



AIRS Only

- V4.2.2 temperature statistics wrt ECMWF, over night land cases between 60N and 60S
- Red/Cloudy Regression or MW only, Blue/Initial Regression, and Green/final retrieval
- V4.2.2 has new RTA as well as new tuning, but no new error estimate or new QC

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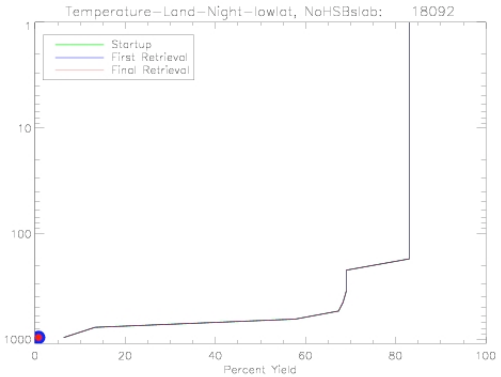
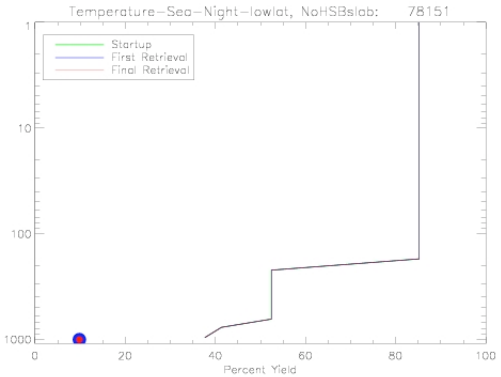
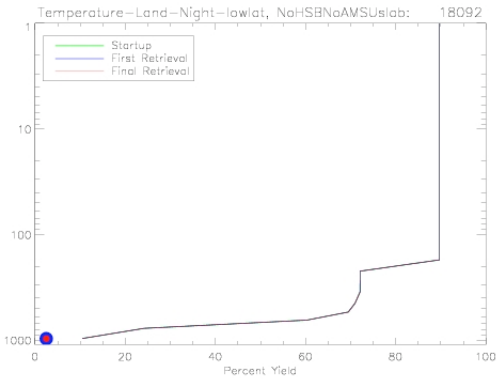
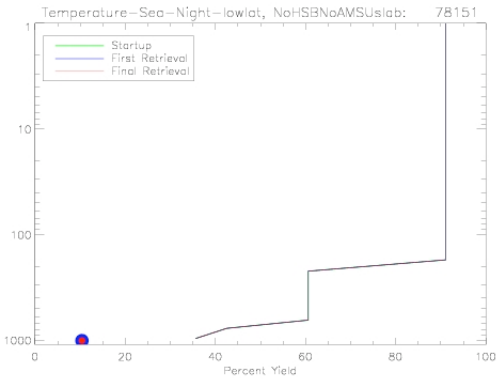
V4.2.2 Yields over Night Cases

	Land	Ocean
AIRS/AMSU		
AIRS Only		

- V4.2.2 (latest version with statistics) has new RTA as well as new tuning, but no new error estimate or QC

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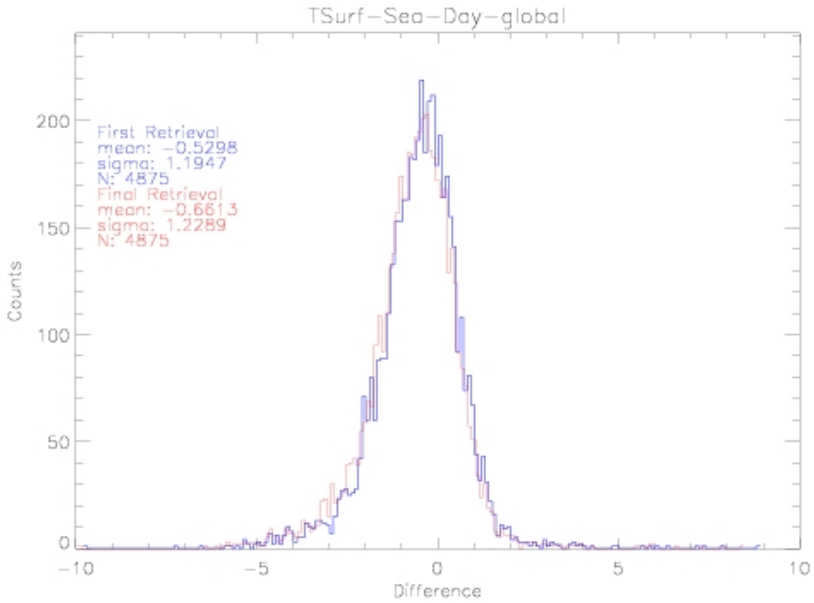
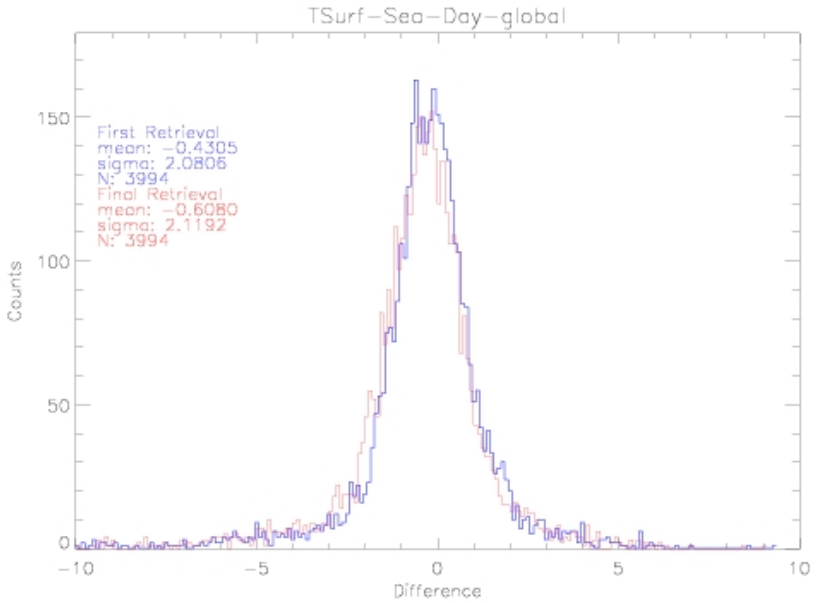
Histogram of Skin Temperature



AIRS/AMSU



AIRS Only

- Both are version 4.2.1 and over day sea
- Outliers Issues are evident in AIRS Only case

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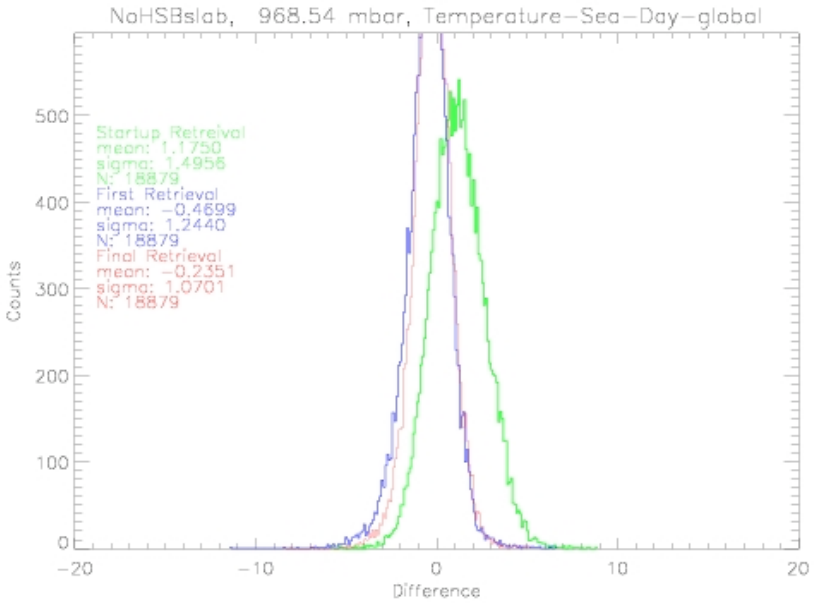
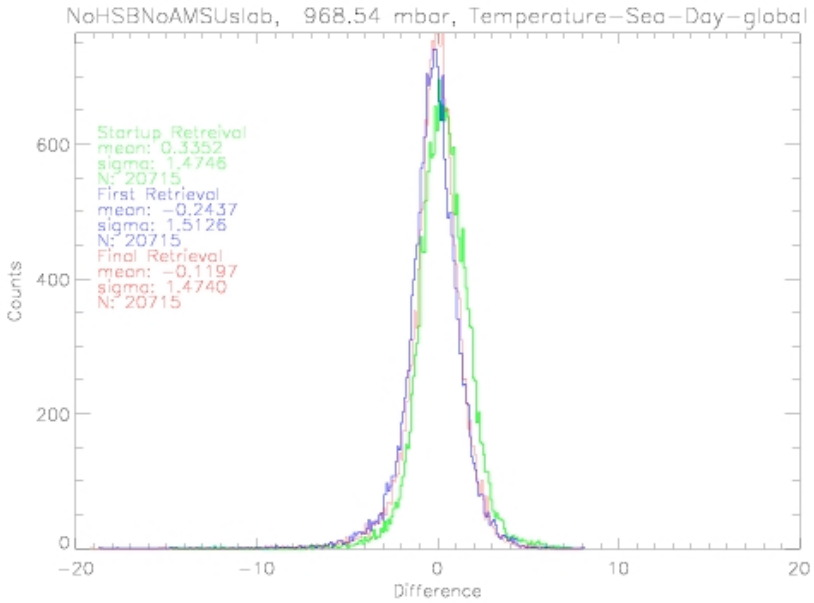
Histogram of 969 mb Temperature



AIRS/AMSU



AIRS Only

- Both are version 4.2.1 and over day sea
- AIRS/AMSU retrieval changes bias in AMSU only retrieval
- Cloudy regression is less biased, but with outliers

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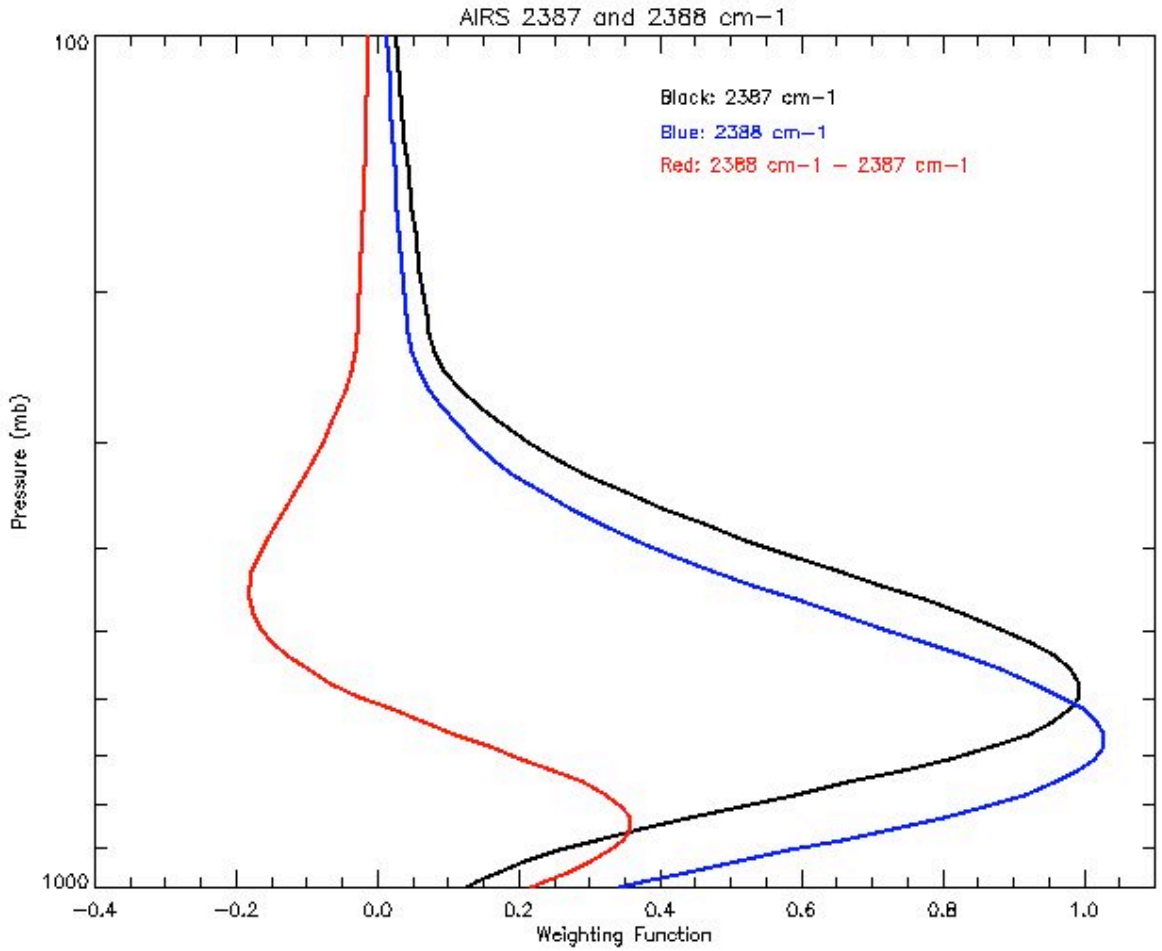
Pseudo Lapse Rate



- Black: 2387 cm^{-1} sensitivity function
- Blue: 2388 cm^{-1} sensitivity function
- Red: Difference of sensitivity funtions
- Both channels see little surface (0.2% and 0.7%) for US standard atmosphere
- Sensitivity functions peak near 600 mb and 700 mb, respectively
- The difference of weighting functions peaks near 500 mb and 800 mb
- PLR is normally close to a lapse rate.

Sylee 2/28/06

PLR Test

- PLR = Tb^{2388} - Tb^{2387}
- TEST = PLR < min(5.0,6*cos(lat)) and abs(lat) < 60 and topog < 2000m
- If TEST eq TRUE, all quality indicators, including Qual_Cloud_OLR, is set to 2 (bad, do not use for data analysis)
- This test will be applied after all retrievals are finished, in addition to other QC tests.
- But retrieved values will be kept for later debugging purpose
- Further study of QC will continue
  - QC based on AIRS only regression based error estimate
  - QC over high altitude area or high latitude area

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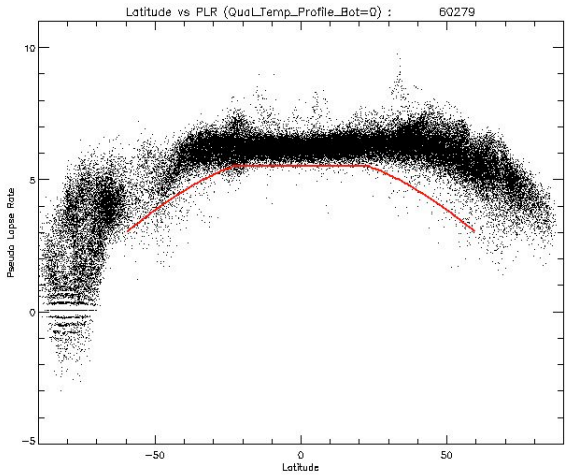
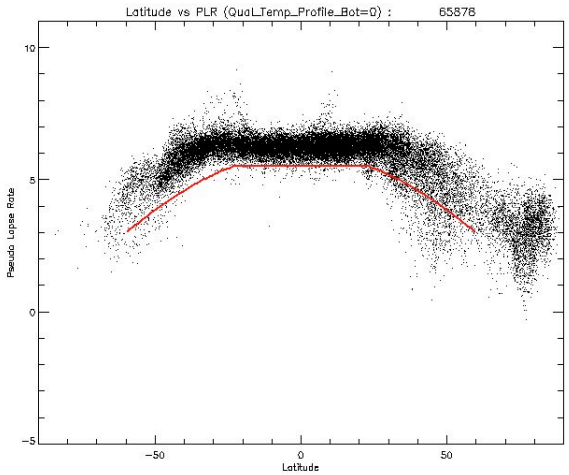
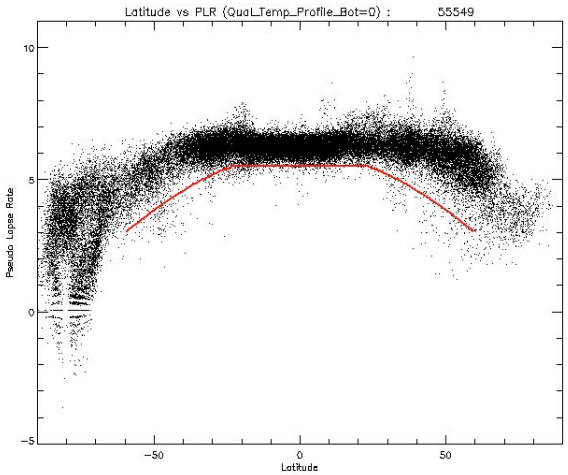
PLR vs Quality Flags: Qbot=0



Sept 6, 2002



Jan 3, 2003



May 27, 2003

- PLR vs latitude for three focus days
- Proposed PLR threshold in red

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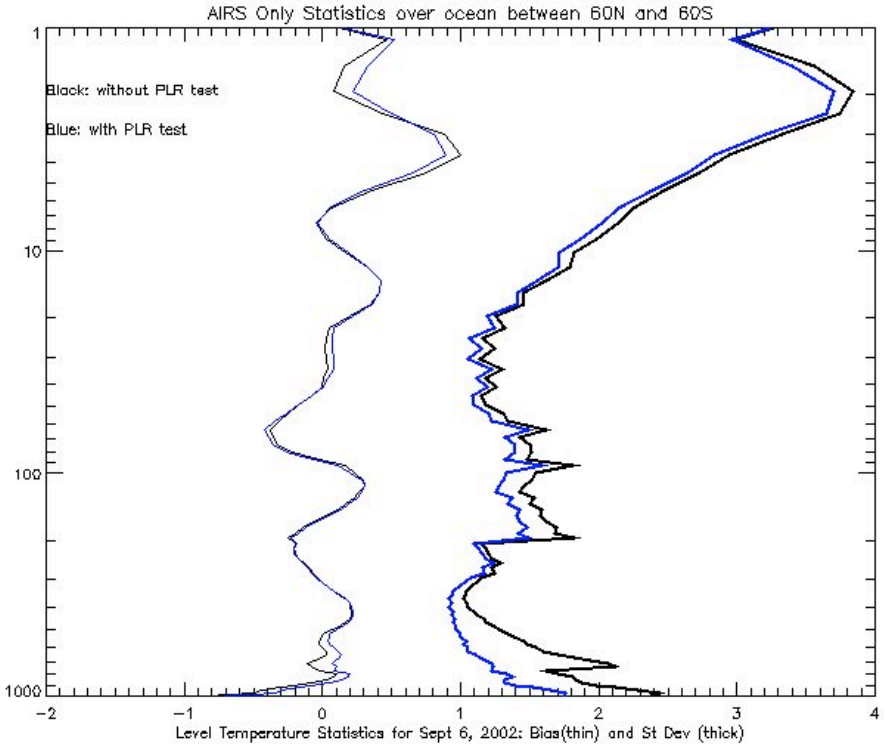
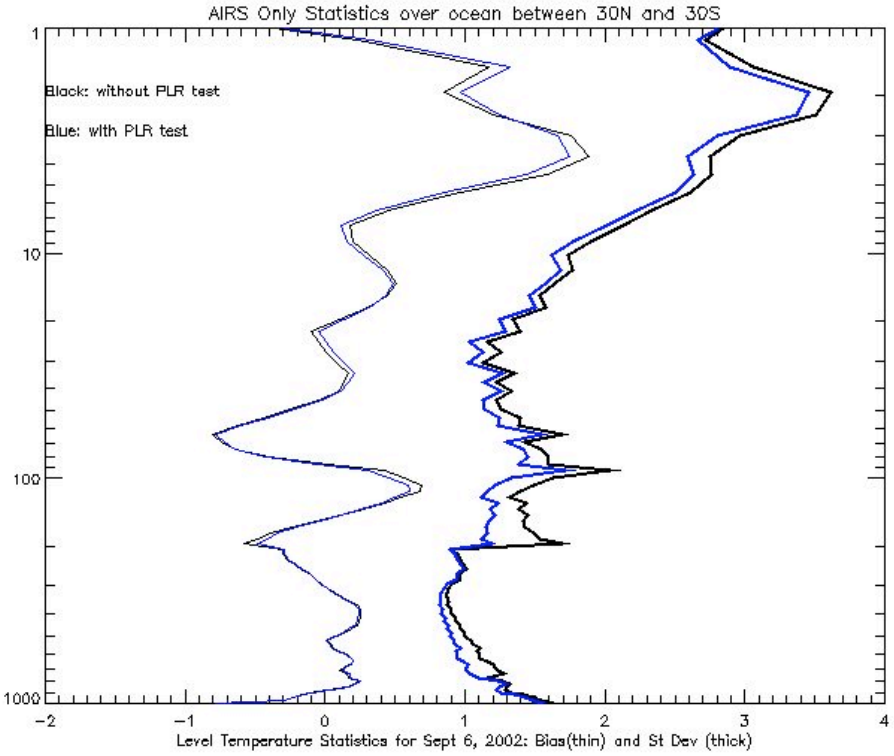
PLR Test Improves Temperature Statistics

Non-polar ocean



Tropical Ocean



- With(Blue) and without(Black) PLR Test
- Point temperature (not layer mean) statistics Version 4.1.12

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Metric for AIRS Only Retrieval

- My personal impression is that AIRS Only retrieval works relatively well when the scene is relatively clear, but with unsolved outlier issues.
  - Measurement without error estimate is not a useful measurement.
- Mous: How do we measure success of AIRS Only Retrieval?
  - How do we compare apples and oranges?
- Three Data Sets
  - S^{AA} : All retrievals accepted by AIRS/AMSU retrieval
  - S^{AO} : All retrievals accepted by AIRS only retrieval
  - S^{C}: The intersection of S^{AA} and S^{AO}
- Compare AIRS/AMSU statistics on S^{AA} with AIRS Only statistics on S^{AO}.
  - QC of AIRS Only retrieval is poorly understood
- Compare AIRS/AMSU statistics with AIRS Only statistics on a common set S^{C} or S^{AA}.
  - This is equivalent to applying AIRS/AMSU QC on AIRS Only retrieval and makes AIRS Only retrieval artificially better.

Plan

- The PLR test was implemented in PGE, but the retrievals are not analyzed yet. (improvement in statistics shown today is from offline testing)
- New training based on the PLR test was requested to Lihang at NESDIS.
- Further study of QC will continue.
- GSFC will generate the regression coefficients for error estimate for AIRS only retrieval and QC based on the regression error estimate.
- We need to define the “metric” for AIRS only retrieval.